



U.S. DEPARTMENT OF
ENERGY

Oak Ridge National Laboratory: White Oak Dam and Sediment Control Structure

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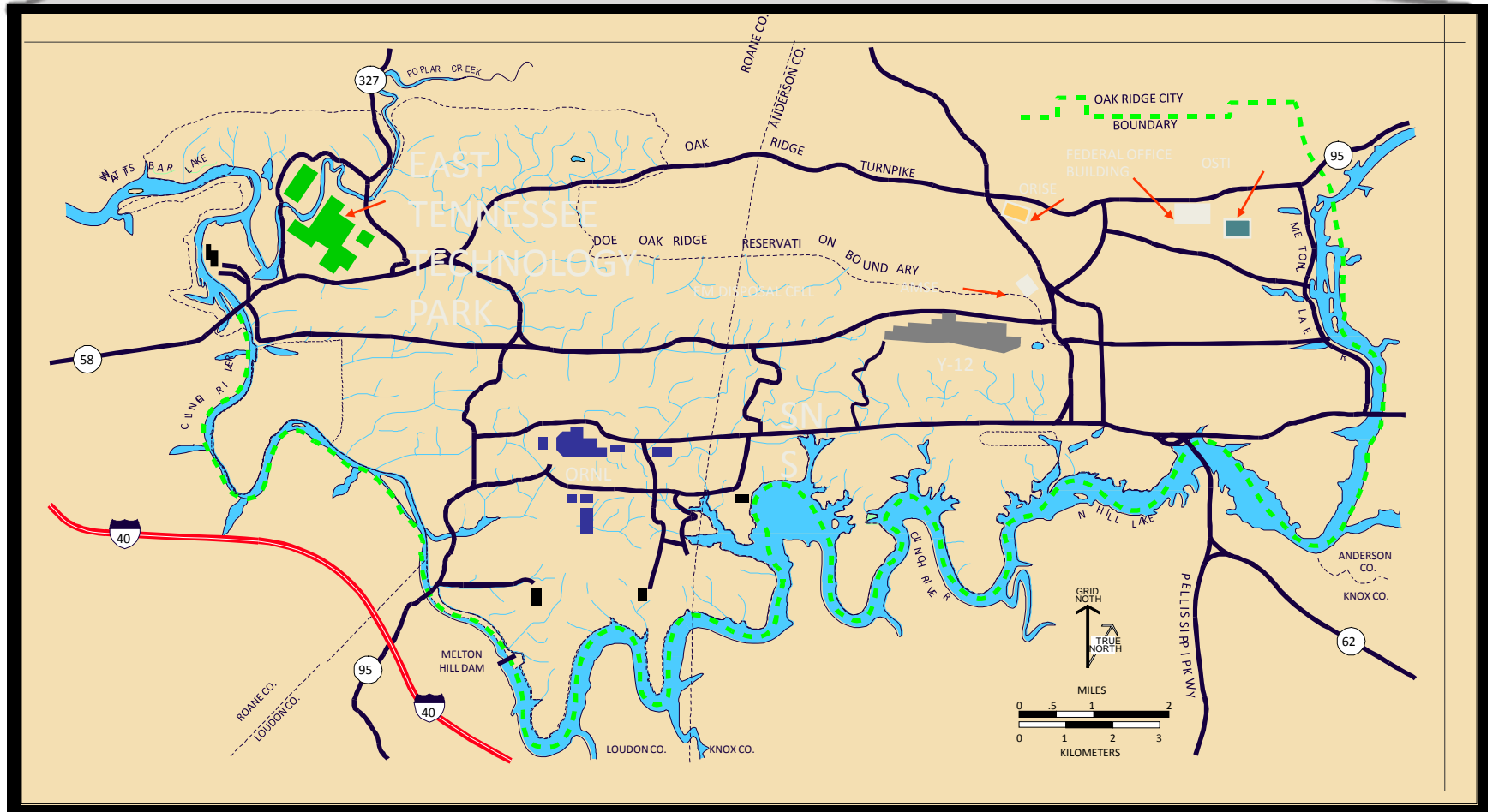
Oak Ridge Site Specific Advisory Board
Oak Ridge, TN ❖ November 18, 2008



EM Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

www.em.doe.gov



Oak Ridge National Laboratory evolved from the Manhattan Project



ORNL in 1943

The Clinton Pile was the world's first continuously operated nuclear reactor

1940's Photo of White Oak Creek



White Oak Dam / White Oak Creek Embayment Sediment Control Structure (Dam)

Pertinent Data for White Oak Creek Structures

Highway embankment constructed w/box culvert:	1941	
Cofferdam installed (box culvert); lake impounded (750' msl):	1943	
Cofferdam raised (753.9' msl)	1959	
Embankment rehabilitated:		1980
New spillway and highway realignment:	1983	
White Oak Creek Embayment dam constructed:	1992	
Drainage area:		6.0 sq. mi.
Stream name:		White Oak Creek
<u>Reservoir</u>		
Reservoir Area at normal pool	25 acres	
Normal water surface elevation (gates open, normal flow through control weir)	744.9 feet msl	
Maximum controlled reservoir elevation (gates closed, normal flow over crest of gates)	750.0 feet msl	

White Oak Lake and Dam



White Oak Lake and Dam & White Oak Creek Embayment Sediment Control Structure (Dam)



White Oak Dam



White Oak Dam – Outlet Control
Structure



White Oak Dam – Outlet Control
Structure

White Oak Dam



White Oak Dam Spillway Gates



White Oak Dam Spillway
Broad-Crested Weir

White Oak Dam

PURPOSE: The dam was constructed in 1943 to contain radioactive sediment in White Oak Lake and minimize the spread of contamination off the reservation.

- White Oak Lake is a CERCLA Site initially created to trap radioactively contaminated sediments
- An estimated 200 curies of radioactive material exist in the lake sediments
- Most of the radioactive constituents in the sediments are short half-life materials
- Decay has reduced the quantity of radioactive constituents by over 60%
- Contaminated sediments have been covered by less contaminated sediments as sources of contamination (burial grounds, liquid waste pipelines, etc.) have been addressed

Embayment Dam

Purpose: To maintain a constant level and prevent fluctuations in water level in White Oak Creek Embayment due to storm flows and TVA power operations

- White Oak Creek Embayment Dam installed to maintain quiescent flow in the embayment and minimize scour of contaminated sediment.
- The gabion structure on top of the Embayment Dam allowed water to pass while maintaining a minimum water level.

The gabion structure is functioning, leaving an elevated water level in the Embayment.



White Oak Dam / White Oak Creek Embayment Dam

2008 Federal Energy Regulatory Commission inspection concluded:

“There were no problems observed that would immediately threaten the safety and continued operation of the dam and appurtenant structures...it was concluded that the dam was maintained and operated in an acceptable manner.”

White Oak Dam / White Oak Creek Embayment Dam

2008 Federal Energy Regulatory Commission inspection identified areas for future consideration to assure continued integrity:

- Structural condition of the original box culvert and cofferdam
- Overtopping of White Oak Dam

White Oak Dam / White Oak Creek Embayment Dam

Enhancements being considered for White Oak Dam:

- Grout fill the existing Box Culvert to reduce risk of embankment collapse
- Fill, extend, and armor the upstream and downstream slope of White Oak Dam to increase stability of the Dam and eliminate erosion and potential failure should “over-topping” occur
- Remove trees and growth along the bank of White Oak Lake